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ABSTRACT

The issue of equal access to and use of computers by boys and girls is reviewed and evaluated from the perspective of social studies content, skills, and goals. Material is arranged in four sections, each introduced by a topic question. The first section discusses the problem of sex equity in computer education. Results of four research studies and surveys are presented. The second section examines the causes of girls' avoidance of computers and related technologies. A male bias in the culture of computers, the educational context in which computers are used (chiefly science and mathematics classes), and peer influences are cited as the major causes of girls' avoidance. The third section places the issue of sex equity within the context of social studies education, examining the implications of unequal access to computers for future citizenship participation, career training, and the study of social roles and social stereotypes. A final section outlines what social studies teachers can do to address the problems of sex equity in computer education. A 13-citation bibliography concludes the paper. (LP)

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SEX EQUITY IN COMPUTER EDUCATION.

CONCERNS FOR SOCIAL STUDIES

ERIC Digest No. 15

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SEX EQUITY IN COMPUTER EDUCATION: CONCERNS FOR SOCIAL STUDIES

Technological literacy—an understanding of the mechanics, applications, and implications of computer and related technologies—has been widely recognized as an educational imperative for the 1980s and beyond.

In view of the crucial role that technology is destined to play in the society of the near future, a number of educators, social scientists, and educational analysts have begun to express the concern that specific segments of today's school age population are being excluded from technological education. The indication is that technologically disadvantaged students are those traditionally excluded from the benefits of education: minorities, rural and inner city populations, and, overwhelmingly, girls. This ERIC Digest reviews recent research on one aspect of this equity issue—the question of sex equity in computer education—and addresses the implications of this research for social studies educators.

Is sex equity a problem in computer education?

While the issue of equality in technology education is just beginning to be systematically studied, preliminary findings on sex inequities in computer access and usage are disturbing. On one hand, female students seem well aware of the potential role of technology in their futures: in a statewide survey of California students, approximately 75 percent of twelfth-grade girls and 66 percent of sixth-grade girls indicated that a knowledge of computers would help them get a better job (Lockheed and Frakt, p. 16). At the same time, surveys of computer education reveal significant gender differences in the interest in and use of computers by school-age children, with boys spending considerably more time on computers both in and out of the classroom. As one example, a 1982 study indicated that girls comprised only 37 percent of the total school computer science enrollment in California. In the same year, a Stanford University survey revealed a boy-to-girl ratio of 3:1 in summer computer camps, enrichment schools, and workshops (Hess and Miura, p. 4). In a similar study of 450 Ontario, Canada public school students, boys outnumbered girls 2 to 1 in their extracurricular use of school computers (*Education Daily*, January 25, 1984, p. 6).

What are the implications of this research for future access to information, employment, and social participation? If, as these initial studies indicate, female students are missing out on, or shutting themselves off from, technological skills that are increasingly seen as basic survival skills, then as adults they will certainly be unprepared for full economic participation in society and a voice in how that society functions.

What are the causes of girls' avoidance of computers and related technologies?

Studies emphasize three mutually reinforcing factors underlying girls' negative attitudes towards and subsequent avoidance of computer technology: (1) a male bias in the "culture" of computers, (2) the educational context of computer education, and (3) peer influences.

1. **A male bias in the "culture" of computers.** Most children gain their initial exposure to computers outside of the school, through advertising and home and arcade video games (Van Nuys, p. 10). These sources critically affect children's subsequent attitudes about computers; the unmistakable message they convey is that the computer is a toy for males. Women and girls are rarely featured in hardware or software advertising and, when they do appear, are generally portrayed as observers of male interaction with the machine. Software programs tend to cater to traditional masculine interests in both graphics and content. Identifiably female figures seldom appear in video game graphics. Moreover, it is difficult to find a computer game that does not revolve around a theme of violence, aggression, or competition. While experts assert that girls have little interest in or identification with the content and action of arcade games (Allen, in *Business Week*, p. 102; Gilliland, p. 42), these same gender-oriented themes have also become rooted in educational software, which feature race cars and rockets in math drill, "word blaster" games in language arts, and war simulations in social studies.

2. **The educational context of computer education.** Placement of computers within the schools significantly affects how this innovation is perceived by children and adults alike. Although a relatively new educational innovation, computers already have become firmly linked with mathematics: computers are introduced in math class and, until recently, have been used almost exclusively in that context. Computer programming is generally taught using Basic, a highly math-oriented language skill, although languages such as Logo and PILOT offer the opportunity to teach programming with graphic and linguistic emphases (Fisher, p. 26). Given the widely accepted sterotype of math as a male domain and the well-documented phenomenon of math anxiety among girls, this educational association of computers with math simply confirms girls' initial impression that computers are not for them. Add to this the fact that, by junior high school, most math teachers are men, and girls have the added discouragement of seeing few if any role models in technology education.

Teachers and parents reinforce the educational stereotype of computers as a male subject just as they have traditionally done with mathematics. Teachers often unconsciously direct computer-related questions and challenging software and programming assignments towards boys while giving girls drill and practice (*Education Daily*, p. 6). The increasing disparity between boy/girl enrollment in extracurricular summer computer classes as cost increases (Hess and Miura, p. 4) is one reflection of a parental conviction that boys need computer training for their adult roles more than girls and are therefore worth a greater investment (Van Nuys, p. 7).

3. **Peer influences.** Aggressive and possessive behavior on the part of male classmates may be the ultimate discouragement for girls considering classroom or extracurricular use of computers. Teachers have cited alarming stories of boys' intimidation of girls vis-a-vis computer use: boys elbowing girls from computer sign-up sheets, discouraging girls from taking computer electives, or annoying girls when it is their turn on an in-class computer (*Education Daily*, p. 6). Educational psychologists point out that such peer pressure is particularly effective coming as it does during pre-adolescence and adolescence when girls are especially conscious of social interaction and are seeking the approval of boys.

Why is sex inequity in technology education an issue for social studies teachers?

The broadening application of technology to every aspect of society makes it clear that technological literacy can no longer be considered exclusively as a math skill. Three

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issues mandate a place for technology education, and the imperative for equal access to that education, within the social studies curriculum: (1) the social issues underlying the causes of unequal access, (2) the critical role technological literacy will play in determining economic opportunity, and (3) the implications of technological literacy for future social and political participation.

1. The factors which discourage girls from using computers or pursuing technology-related coursework involve social problems which are properly treated within the social studies curriculum. Social studies classes can and should explore the issues of sex role stereotypes and cultural attitudes which affect social behavior.

2. *A Nation At Risk* predicts that by the year 2000, millions of jobs will involve laser technology and robotics (10). It is important for social studies teachers to realize, and in turn to make students aware, that these are not solely "high tech" jobs, a concern for science and math departments. In addition to jobs traditionally considered to be math-related professions, technology is radically transforming a wide range of professional and nonprofessional occupations, including health care, food processing, media industries, construction, architecture, choreography, teaching, business and government administration, marketing, social services, and law enforcement.

Social studies teachers are largely responsible for teaching career awareness at the elementary and middle school levels and have the primary jurisdiction for preparing all children for adult economic responsibility and participation. Girls must not be allowed to remain aloof from computer education under the mistaken assumption that technology is irrelevant to most social science, humanities, or blue collar jobs.

3. The prediction that computer literacy will soon affect individuals' abilities to exercise their citizenship rights and responsibilities clearly mandates a place for technology education within the social studies curriculum, and just as clearly makes the issue of computer equity a social studies concern. Given the growing use of computers in accessing information and in political decision making, the social studies goal of effective citizenship cannot be achieved unless all children are provided with a knowledge of computer technology and informatics (Glenn and Klassen, p. 117). The demands of the Information Age clearly involve not only those math-related skills required to program a computer, but also the higher level cognitive skills—accessing and analyzing information, decision making, and problem solving—necessary to understand the implications of technology to social, economic, and political situations. Allowing any group of students to fall by the wayside in acquiring these skills will effectively exclude them from understanding and participating in the political process or from making informed decisions on technical issues which will affect their lives. It is not surprising that the 1984 Scope and Sequence of the National Council for the Social Studies has determined that technical skills unique to the use of electronic devices be included among "skills essential to citizen participation" *(Social Education,* p. 262).

What can social studies teachers do to address the issue of sex equity in computer education?

As computer-assisted instruction becomes more common in the social studies classroom, teachers should consider a number of immediate strategies for positively influencing children's attitudes towards and use of technology.

1. By establishing a clear social studies context for technology education, teachers can make significant strides towards dispelling the notion held by both boys and girls that computers mean math and math is for boys. Programs such as ComputerCamp, Inc., and EQUALS report that many girls show more enthusiasm for computers when they can use this technology in the context of humanities, art, music, or other areas relevant to their own personal or academic interests.

2. In teaching social studies units with a technology component, (e.g.)—the Industrial Revolution, career awareness, or future studies, teachers should emphasize the impact and relevance of technology on everyone's lives—at work, at school, and at home—and the applications of technology to a host of occupations.

3. Social studies teachers can make efforts to counteract hidden sex bias in technology education. They can screen social studies software for male and female figures in graphics, sex-role stereotyped presentations of these figures when they do appear, gender-oriented themes and formats, and linguistic biases. As a related awareness activity, teachers can incorporate the exploration of technology-related sex stereotyping into units on propaganda, advertising, and consumer education by having students analyze television and magazine advertising or write letters to software companies. Teachers can make conscientious efforts to bring female resource persons in to speak about computers and technology.

4. To assure that boys and girls feel an equal sense of ownership of classroom computers, teachers should be aware of classroom interaction and hidden messages in their own teaching strategies. They can encourage girls and reinforce equitable attitudes by calling on girls and boys to demonstrate a new program or answer computer-related questions, ensuring that all students get experience with programming and problem-solving courseware in addition to drill and instruction, and providing equal extracurricular access to computers.

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